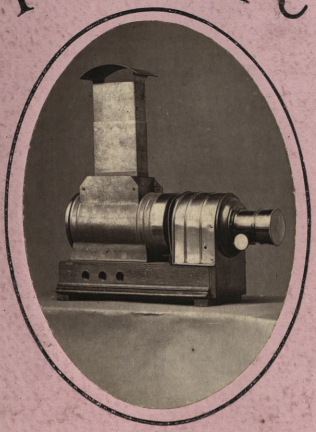
THE

SCIOPTICON



MANUAL.

CONTAINING FULL DIRECTIONS FOR USING

THIS NEW DRAWING-ROOM LANTERN.

ALSO A VARIETY OF

OPTICAL AND CHEMICAL EXPERIMENTS

THAT CAN BE PERFORMED WITH THE SAME.

THIRD EDITION.

PRICE ONE SHILLING.

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THIRD EDITION.

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PREFACE TO THIRD EDITION.

Since the introduction of the Sciopticon into this country, three years ago, this really useful instrument has found great favour with all those interested in Magic Lantern exhibitions, private or public, as the numerous testimonials received by the manufacturer shew. Its lightness, portability, simplicity, all being generally commented on, and often by those who also possess complete apparatus for lime or oxycalcium lights, only very special occasions justifying the time and trouble necessary to prepare the gas, &c., for an evening's entertainment, while two or three minutes suffice to have everything in order to shew the owner's selection of slides to any friends who may pay him an evening visit. Several important improvements have been added since last season, the back glass, through too sudden heating, being liable to crack, is now replaced with a sheet of mica, inserted in a brass frame, and arrangements are being made to replace the front one with the toughened glass of M. Bastie, thus obviating all chance of any hitch. The part also forming the division between the two chambers is now made removable, so that jets for the lime light may be introduced where the instrument is required to be used before a very large audience. These will be supplied where required, so that either oil or gas may be used at pleasure.

Several articles in the present edition, written by men of standing and repute, both in this country and America, will greatly help the Reader in his judgment of the merits of the Sciopticon.

THE SCIOPTICON.

INTRODUCTION.

All those who are interested in the magic-lantern—whether as a home winter-evening's amusement, or in its higher mission as a means of education—must have felt the want of an instrument that should take a medium place between the old-fashioned, clumsy oil magic-lantern and the troublesome and expensive oxy-hydrogen lanterns. This place the Sciopticon just fills; it is compact, the body of the lantern being no larger than the diameter of the condensers; its light is twice or three times as powerful as any oil lantern, and not far from the brilliancy of the oxy-calcium; although burning paraffin oil, there is no danger from it, as the lantern is divided into two chambers—one containing the lamp, the other the flame—so that the former never gets even warm. By the arrangement of a double flame placed edgeways, a most powerful light is obtained, which will illuminate a 10-feet disc with great brilliancy. They are all fitted with photographic double achromatic lenses, the part holding the lens being slightly separated from the body of the lantern, giving sufficient light to the operator to see what he is doing. The top of the place where the slides are introduced being open admits of tanks being used, and a beautiful variety of chemical experiments performed, which are not possible with the ordinary lantern. The case containing the instrument is so arranged that, when placed on a table, the Sciopticon, when placed on it, stands about the height necessary to show a 10-feet disc.

The dissolving apparatus, which consists of two lanterns, a box which forms a shelf for the slides and folding legs, is particularly convenient and portable, the whole being carried about with the greatest ease.

The condensers being larger than those generally used for photographs (4 inches), never cut off the corners of photographic views, as is often seen with a 3 or $3\frac{1}{2}$-inch.

The word Sciopticon is derived from two Greek words—σκιὰ (skia), shadow, and ὄψις (opsis), view, thus signifying a "shadow picture," thus the appropriateness of the name will be at once apparent.

The inventor of this instrument is Mr. L. Marcy, of Philadelphia, who has devoted several years to its perfection, and which is now brought before the English public for the first time.

Description of the different parts forming the Sciopticon.

The lenses, mountings, &c., are shown in section. What is left of the frame and cylinder, the lamp, chimney, reflector, &c., are shown in perspective. The parts are as follows:—

a b—Front combination of the objective cemented together.

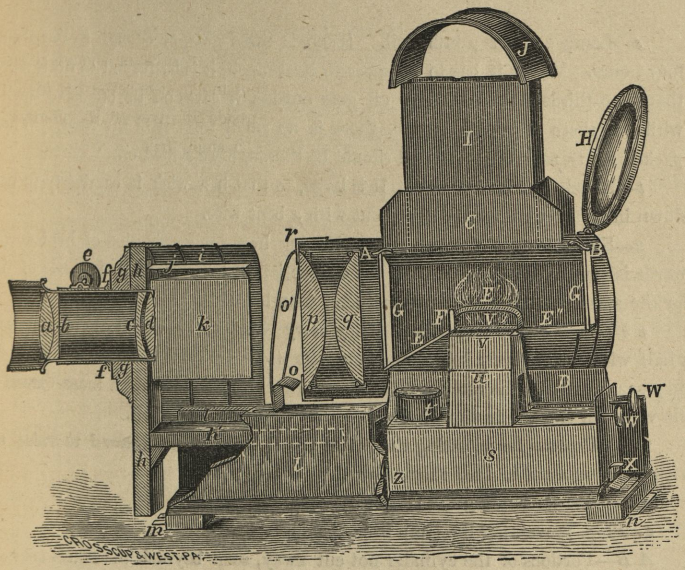
c d—Back combination separated by a ring. If the cells holding these combinations are unscrewed and the lenses removed, they must be returned in the same order and position as seen in the diagram. There is no need of removing them. Even the outer surfaces of *a* and *d* will seldom need dusting if kept in a clean place with the caps closed. They should not be fingered, and the brush or fabric used for dusting them should be clean and soft.

e—Milled head for adjusting the focus.

f f—Flange attached to the projecting wooden ring *g g*.

The lens here represented is a quarter-size portrait objective of $4\frac{1}{4}$ inches back focus, requiring an aperture in *g h* of $2\frac{3}{8}$ inches in diameter. If a larger lens is used, the aperture in *g h* has to be enlarged. If the back focus is more than 5 inches, the extension from *h k* must be drawn out more or less from the main body, as is shown in the diagram. If the focus is shorter than $3\frac{1}{2}$ inches, the ring *g g* is removed by taking out the screws, and letting the flange *f* back to *h*.

h h h'—Wooden frame of the extension front; *h'* sliding in a groove within the body frame *l l*.



THE SCIOPTICON.

Fig. 1.

l l—Portion of the wooden frame, the rest being mostly cut away to show the lamp, and how the extension front slides into its groove.

m—Claw attached to the front foot.

n—Flange under the back foot. On the top of the Sciopticon case, or box in which it is carried, and which can be placed upon a stand or table to elevate the instrument to proper height while in use, are two round-headed screws, slightly raised, and at the distance apart of *m n*; *m* clings to one, and *n* slips under the other, thus holding the instrument firmly in place. When a pair are used for dissolving views, the fronts are thus held in a fixed position, while the rear ends may be spread apart till the discs on the screen coincide.

o o—Stage and spring for the regular sized wooden-mounted pictures. The operator standing behind, slides a picture horizontally in at *o*, letting it bear against the condenser mounting, and letting it project equally both sides of the cylinder. The picture is drawn out with the left hand, while with the right hand another is made to follow in its place, so as not to show the white disc on the screen. For shewing photographic slides, a carrier is supplied with each instrument.

p q—Condensing lenses. Lenses when taken from a damp or cold place are apt to become covered with moisture, which shades the pictures. It is better when this is likely to be the case to let the instrument stand in a warm room awhile, or else to draw the lenses apart and dry them before beginning an exhibition.

r—Brass ring, holding the condenser cells suspended in the cylinder, so as not to be anywhere in contact with it. To remove the condenser, the extension front is drawn off, and the stage *o* is lifted out of its place.

s—Lamp cup for paraffin oil. It holds three gills, or enough to last about four hours. When it has to be moved about much, it is better not to fill it more than two-thirds full, for if any oil gets outside it gives off its offensive smell; while, if there is no oil outside, there is no smell from it in the least. When packed for transportation, the oil should be thoroughly drained off.

t—Nozzle to admit the oil. It is large, so that if a wick is carelessly turned down into the cup it can be fished out with a bent wire.

u—Side of one of the two tubes, showing how the conduction of heat downwards is counteracted by breaking the connection in the metal. It is made of tin, for the reason that it is a slower conductor than brass.

v v—Tops of the two tubes. They carry No. 3 wicks, which are an inch and a half wide. The lamp being taken out, the wicks are pushed down the tubes till they are caught by the ratchet-wheels and drawn down. Should a loose thread of the wick get clogged in the wheels, it must be drawn and cut off.

w w—Buttons for adjusting the wicks; both are turned *inward* to raise the wicks, and *outward* to draw them down.

x—Spring for holding the lamp.

z—Stop, preventing the lamp from sliding in too far.

A B—Portions of the cylinder not cut away, seen beyond the condenser and flame-chamber.

C—Portion of the cylinder turned up, to give free ventilation all about the flame-chamber.

D—Portion of the cylinder turned down and supported by the wooden frame.

E E′ E″—Bottom of the flame-chamber. It is not supported by contact with the lamp, thus avoiding the conduction of heat downwards. The slot through which the flame ascends is two inches long by half an inch wide. *E′* answers to the deflecting cap of a common lamp. *E″* is level, to allow the lamp *(the wicks being turned down)* to slide in and out. *E* slopes so as not to shade the light from the condenser. This portion of the Sciopticon is now made to draw out, so as to introduce the jets for lime-light.

F—Narrow strip of glass, quarter of an inch wide, held in a socket before the flame, to give upward direction to heated air. It will not crack from heat because it is so narrow, and without obstructing light it takes from the glass *G* its liability to crack.

G G′—Front and back glasses of flame-chamber, resting in grooves in the ends of *E E″*, and slipping under springs at *A B*. These glasses close the openings of the flame-chamber, so that the outer air, in its pressure to fill the place of the lighter heated air, can only get access up through the deflector at *E′*, impinging upon the two wide flames, and bringing them over a column of air rising up between the spread tubes, producing perfect combustion and a white intense light. A sheet of mica, enclosed in a brass frame, is now substituted for the back glass.

H—Reflector used also to close the rear of the cylinder. The centre of concavity is at *E′*, so that reflected rays are thus made to coincide with incident rays from *E′* to the condenser.

I—Chimney, giving large outlet to heated air.
J—Chimney cap, for darkening the outlet.

Directions for Manipulating.

When a new instrument is unpacked, the lenses, &c., should be well cleaned with a soft duster or wash-leather.

Warm and dry the condensing lenses, if inclined to fog from change of temperature.

Fill the lamp about two thirds full of best paraffin oil, taking care not to spill any outside, which would cause the lamp to smell when in use; also avoid tilting the lamp too much for the same reason.

Turn down the wicks and insert the lamp.

The centre of the instrument should be about 5 feet from the floor of the apartment.

The image enlarges as the distance of the instrument from the screen increases, a distance of about 16 feet giving an 8 or 10-feet disc.

Lights should be turned down near the screen, but may be left dimly burning out of range of the screen.

Light the lamp in the instrument, as it stands in the diagram, by removing the mica back *G'*, turning up the wicks by a turn inward of the buttons *w w*, and reaching the wicks *V V* through *E* with a lighted match. To avoid smoke turn the wicks almost down again till the mica is replaced.

Turn up the flames evenly about half-an-inch at first; they will rise a little after the wicks are worn, when they may need looking to again, after which they will stand steady without requiring further attention.

Put out the light by drawing the wicks down with a turn of the buttons outward, and then blowing under the reflector.

The wicks may be trimmed when the lamp is taken out to be filled; cut them level; it may be done more evenly by only removing the black part.

With proper management a pair of wicks should last for 12 months, by occasionally rubbing them smooth with the finger.

While exhibiting, the operator should stand behind the instrument, having the slides arranged at his right in the proper order and inverted position required for exhibition. If the instrument is in front of the screen, the wire ring fastening the double glass into the wooden mounts of the ordinary mounted slides should be towards the condenser, in order to show the views right-handed position.

Take care that the moveable portion over the lamp is pushed back as far as it will go as otherwise the lamp would not burn well.

Pass the slides in with the right hand, level and true, without jumping them about. The stage *o* slants down to the condenser to keep the slides close to it.

Take the slides out with the left hand as others are pushed into place, so as to leave none of the white disc visible, and put them in their box as before. A slide standing endwise between those which have been used and those which have not, will keep them apart. This advantage the Woodbury slides possess, in not being square.

Tanks for insects, fish, chemical experiments, &c., &c., slide into the stage as easily as pictures. The stage being open at the top, with no bulky lantern case to obstruct it, is peculiarly suited to all such operations.

The simplicity and completeness of the Sciopticon is more evident in practice than may seem while considering so wide a range of details and contingencies. The advantage of having an instrument so completely under one's hand is not only felt by the operator, but the smoothness it gives to the exhibition is appreciated by the spectators.

It is, moreover, graceful and neat as a piece of philosophical apparatus.

Some of its advantages may be gleaned from the following notice from an American Journal:—

"We desire to be modest about it, yet we are stating the fact and the truth, when we say that the *Sciopticon* was the first oil lantern that *ever* worked well and satisfactorily. Moreover, it is the only one that does it to perfection now. All

who have examined and compared so decide; the Franklin Institute by awarding its inventor a medal, although various other "opticons," which were copied after it, were exhibited and tried beside it, so decided, and so will all who test the matter also decide.

"In support of what we say, we state below what are, among others, some of the advantages peculiar to the Sciopticon:

"1. *The Sciopticon Arrangement of Two Flames* was the first that ever proved a success. It has been counted a striking novelty not only in America but in Europe.

"The *Franklin Institute Journal* says of it: 'We have witnessed a number of experiments with this lantern, and can fully indorse it as a great advance on anything before used in the shape of a lamp-illuminated magic lantern. For parlour or school exhibition it may well take the place of the far more troublesome oxycalcium lantern, which it rivals in efficiency.'

"2. *Direct Conduction of Heat to the Oil is Broken* in the Sciopticon lamp-tubes by breaking the metallic connections.

"3. *The Deflecting Cap* is suspended from the lantern body so as *not* to rest upon the fountain, to heat the oil by direct conduction. The lamp slides horizontally under this cap into its proper place, where it is held by a spring. When drawn out to be filled or trimmed, there is no cap or chimney in the way to be removed.

"4. *The Sciopticon Flame-Chamber* allows the frame holding the front glass to shut down from outside, and the one holding the back glass to slip under a catch, both at a safe distance from the flame.

"5. *The Double Walls* peculiar to the Sciopticon, and the wider upward openings as recently modified, prevent its becoming so much heated as to be troublesome. The wooden frame does not extend high enough to be warped or shrunk by the heat.

"6. *The Opaque Walls* of the flame-chamber and chimney, except where glass is necessary, relieves us from the trouble and expense of fragile glass or mica chimneys, and also prevents the dispersion of light.

"7. *The Chimney Cap* of the Sciopticon now telescopes into its base, so as to give added length and greater draft when drawn up.

"8. *The Cylindrical Form* of the body is suited to the size and shape of the condenser at one end, and the reflector at the other with opening flaps, setting it above the wooden frame, giving a lamp-chamber and a condenser-chamber both separate from the flame-chamber, and allowing unobstructed air-passages without escape of light.

"9. *The Reflector* is outside the flame-chamber, and its place is fixed, so as to require no adjustment of distance or direction.

"10. *The Condenser* is suspended, free from contact, in a chamber separate from the flame-chamber, with free space between, open above and below. Its front band presents a good bearing for resting the slides against, without exposing the glass to be scratched by them. Its two lenses are removable, while yet they are securely held in concentric cells by wire rings sprung into grooves.

"11. *The Stage* allows the pictures to slide horizontally into place, one after another, without exposing a blank disk.

"12. *The Extension Front* is readily removed, to give access to the interior of the instrument and for various experiments. It can be drawn forward to suit a lens of longer focus.

"13. *The Stage and the Adjustments* are all under the hand of the operator, standing *behind* and looking towards the screen; even when a pair of dissolving lanterns are used.—*Philadelphia Photographer.*"

The Oil.

Paraffin or Kerosene (Young's crystal oil), each answer well for the Sciopticon lamp. By adding to every gallon about a quarter of an ounce of camphor and a few drops of oil of lavender, any disagreeable smell is scarcely noticed.

Each instrument is packed in a stained wood case, measuring only 13 × 13 × 6½.

All are tried before sending out, and the lamps thoroughly drained, the wicks being left in place ready for use.

The Screen.

There can be nothing better for the projected pictures than the white-finished, white-washed, or white-papered walls of many a lecture room or dwelling. An appropriate space specially set apart and papered with white wall paper, having an outline, say, of a wide recess or niche for statuary, is an inexpensive and not inelegant fixture, on which to display before the assembled household, without waste of room or trouble in arranging, all the richest treasures of the four quarters of the globe. The time is coming when, for purposes of demonstration and illustration in the lecture-room, this *whiteboard* will rival the *blackboard.*

The best material in the market for a movable screen of good size, seems to be bleached sheeting of close texture, but not very fine, three yards wide. It has the advantage of being available whether the instrument is placed before or behind it.

As, however, every pencil of light falling between the open threads of the texture is lost, it is better, when the instrument is invariably to be placed in front, to cover the surface with whiting or paper, keeping it smooth by mounting it on a roller. When illuminated from behind, the screen should be wet, to tighten its texture and to make it translucent, and consequently luminous on the side towards the spectators. It can be wet and then stretched upon a frame, or first mounted and then sprinkled to saturation. For home use, a sheet may be stretched across the frame upon which the folding doors of most modern houses are hung, the doors being thrown open at the commencement of the exhibition. A waxed screen is often recommended, but it is little used on account of the difficulty of keeping it smooth and clean.

To widen the screen to more than nine feet, join the added width to each side, rather than bring a seam into the centre of the views.

Beautiful effects may be produced with statuary and similar subjects, by using as a screen a piece of finely-ground focussing glass, about two feet square, which, being suitably framed, may be placed on the table to receive the image.

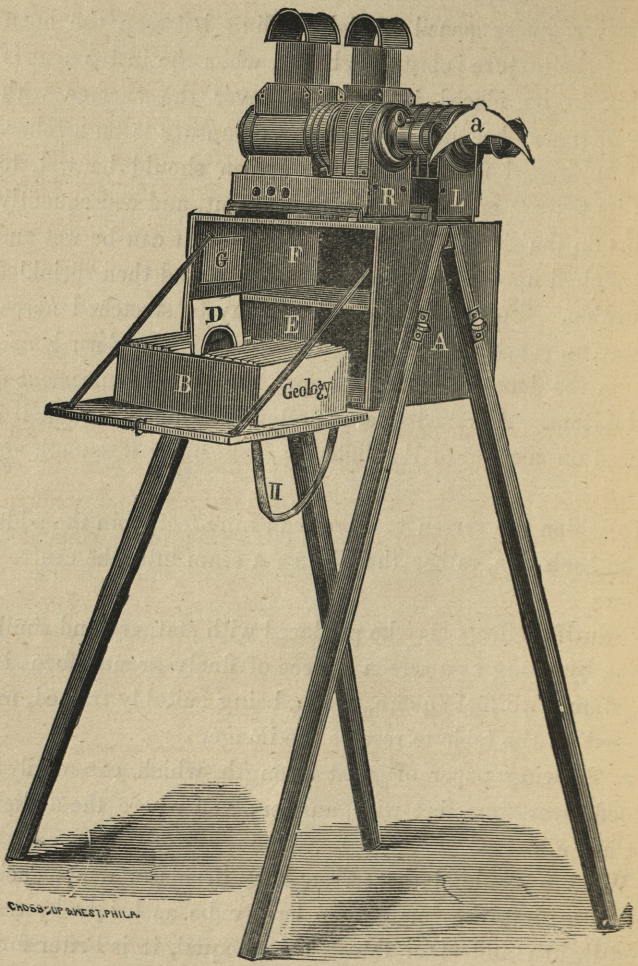
A drawing paper of great strength which can easily be obtained, over four feet wide, answers well where the audience is not large.

Working behind the screen has, in many cases, decided advantages, but the images can hardly be as bright by transmitted light; and other things being equal, it is better for the instrument to be in front.

DISSOLVING VIEWS.

The Stand.

The peculiar stand represented in Fig. 2 is mostly the one used with Sciopticon dissolving apparatus, and so can better be described with it, but it is not necessarily a part of it.



PAIR OF SCIOPTICONS ARRANGED FOR PRODUCING DISSOLVING VIEWS, ON PORTABLE STAND.

Fig. 2.

It consists of a well-made box, mounted on two pairs of adjustable legs, attached by fixed thumb screws and nuts.

When the apparatus is taken down, the legs swing together on their hinges, and are tied in a bundle; the open side of the box becomes the top; the instruments occupy the divisions *E* and *F*; the dissolver is drawn apart and placed alongside; the caps are removed from the chimney and placed

in the rear; the box of slides occupies the space in front; the swing shelf *C* becomes the lid, and is locked down; the strap *S* and its mate, now hidden under the instruments, meet over the top for one carrier, or serve like the ears of a basket for two.

But as a stand, as seen in the diagram, the front of the box becomes the baseboard, and like any other 13 by 17 inch board, affords suitable standing room for the apparatus; it is more likely to keep it level than a separate board, as it is dovetailed and firmly fastened in place.

Dissolving Apparatus Arranged.

The fronts of the Sciopticons *R* and *L* hold firmly by claws to two screw-heads, $7\frac{1}{4}$ inches apart: the flanges in the rear slide under two similar screw-heads, holding the instruments down, but allowing them to spread till their discs coincide on the screen.

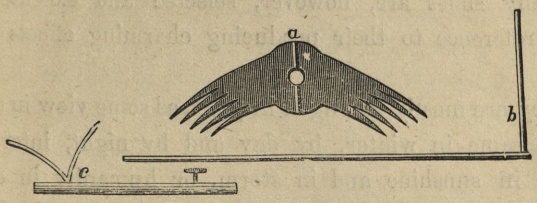


Fig. 3.

The construction of the dissolver is shown in the drawing, Fig. 3, in its three parts. The dissolver *a* is mounted on the arm *b* by means of a screw, as seen in Fig. 2, so as to cover alternately the tubes on *R* and *L*, as it swings from side to side. The horizontal part of *b* slips into *c* till the length of the united axle just allows the dissolver to swing clear of the tubes, and the whole is held in place by a socket spring at each end of the base-board.

The dissolver is operated by the handles at *c*, which are adjusted at the proper angle to limit the lateral movement of *a* to the distance between the tubes.

Light the lamps in their place by reaching the wicks with a lighted match, and attend to them at first to see that they burn

steadily and evenly. Focus a picture in *R*, for example, while *L* is covered by the dissolver, and in *L* while *R* is covered; this reduces the discs to equal size on the screen. With the slides removed, and the dissolver in the position as shown in Fig. 2, spread the lanterns till the discs coincide.

Directions for Producing the Dissolving Effects.

With the lanterns lighted, and arranged as shown in Fig. 2, and a slide placed in each, then the gradual moving of the dissolver will very mysteriously dissolve one view into another.

This effect is commonly produced with slides not specially arranged for the purpose; but it is desirable that they should be of similar size and shape, and that they should be put in evenly, so as to cover the same space on the screen.

Many slides are, however, selected and executed with special reference to their producing charming effects in dissolving.

They are mostly arranged in pairs, as some view in summer and the same in winter, by day and by night, interior and exterior, in sunshine and in storm, or humanity in opposite moods. Sometimes the series are more extended, as the Seasons, the Voyage of Life, &c., and sometimes they are in connection with chromatropes, to represent volcanic action, conflagrations, fireworks, turning mills, &c. Suppose, for example, St. Peter's at Rome, is thrown upon the screen from *R*, and a night view of the same is placed in *L*; then as the dissolver is changed, St. Peter's with its surroundings continues on the screen, but an appearance of night comes over it; the windows glitter with a thousand lights, and the moon makes its appearance in the heavens; now suppose a slide, suited to the purpose, is placed in *R*, then as the change proceeds, fireworks will rise from the darkness and illuminate the sky.

The snow effect is produced by a strip, usually of silk, with pin-holes all over its surface, mounted on rollers within a slide,

so that when the silk is rolling up, snow flakes appear on the screen to be falling. Let, for example, a farm house scene be projected from *R* upon the screen, amid all the glory of summer vegetation; place the snow slide in *L*, and let an assistant slowly roll it up while the dissolver passes over, the snow shows plainer and plainer, till nothing but the falling snow appears. Now place in *R* the same view in winter, and turn back the dissolver; the storm subsides, and the farm house scene again appears in the morning light, covered with the newly fallen snow of the winter's night.

To bring out statuary on a blue ground, a slide of blue glass, and usually one of red glass also, is used. Change any scene, first into a red disc, then the red into blue, and then let a piece of statuary slowly come out into the blue ground, while the blue becomes darker and darker, till it ends in a blackness which seems to add vigour to the representation.

A beautiful effect is produced by the wheel chromatrope, used continuously in one of the lanterns while a series is shown in the other, turning it inward and outward alternately as the dissolving proceeds. It thus seems to suck up the vanishing scene as in a maelstrom, and to bring out its successor with scintillations of coloured lights.

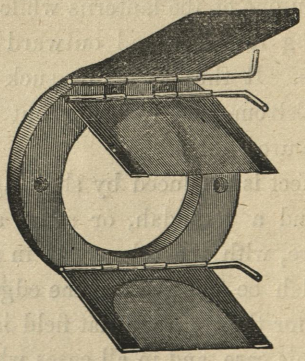
A pleasing effect is produced by showing a series of views in one lantern, and a verandah, or some appropriate design with opaque centre, with the other. If in adopting this suggestion the verandah be focussed for the edges of the field, and the view focussed for the centre, a flat field is obtained over the entire disc. In this case, and in all cases when light from both lanterns is to appear, the dissolver is slipped up an inch higher, and kept in position.

The slow or dissolving process may become monotonous, and it is not always appropriate. We hardly like to see Pilgrim in his "Progress" fading away, while his *double* by his side is slowly growing in strength and vigour. It is better to allow the axle of the dissolver to turn at once, flashing the change upon the disc.

Much use can be made of this expedient, as it is so easily effected in the apparatus represented. A duplicate picture placed in *R* and *L* in reverse order, the dissolver being changed back and forth with a sudden movement, will show an "about face" as of a person bowing to the company, a lion uneasy in his cage, &c.

Lightning may thus be made to flash upon scenery, especially when the view is darkened somewhat, by turning down its light a little, giving the appearance of a rising tempest.

A beautiful effect is obtained by means of the slide tinter shewn in annexed engraving, by which effects of moonlight, sunrise, and other effects can be given to plain photographs. It is adapted to fit over the front objective, and has also an opaque shutter, which causes the picture to gradually disappear.



THE SLIDE TINTER.

CHEMICAL AND OTHER EXPERIMENTS.

That may be Performed with the Sciopticon.

The Sciopticon being open at the top where the slides are placed, is in consequence admirably adapted for all sorts of chemical experiments, as well as for showing live animals, such as larvæ of gnats, shrimps, small fish, &c., thus spreading out an evening's entertainment where the number of slides is not great.

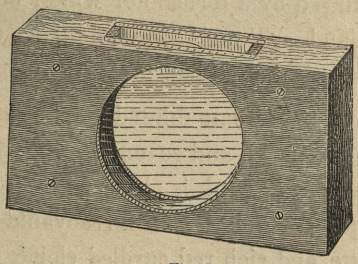


Fig. 4.

For this purpose there is needed, in the first place, a simple apparatus consisting of a small tank, Fig. 4, made by securing two plates of glass, about 4 × 5 inches, with four clamps, against a strip of rubber about $\frac{1}{2}$ inch thick bent into the three sides of a rectangle, and notched at the corners to facilitate its bending.

We then require one or more glass pipettes provided with elastic balls, as shewn in annexed drawing—

Fig. 3.

A few small pipettes, made by simply drawing short pieces of glass tube to a fine point, are also useful.

In addition, a few bottles, with such ordinary chemicals as will be mentioned further on, will complete the outfit.

Having placed the tank, three-quarters full of water, as an object in the lantern, a number of chemical reactions can be shewn, as follows :—

1st Experiment. Pour in a little solution of sulphate of copper, and mix it well with the water of the tank ; then with the pipette run in, with more or less force, some diluted ammonia, pausing from time to time to observe the progress of the effect. On the screen will be observed the gathering of a tempest of black storm-clouds, which twirl around in violent commotion, as if urged by a tornado of wind ; but as the action continues, these clouds will melt away and leave the entire field of a serene and beautiful sky-blue.

By now throwing in some diluted sulphuric acid, the same changes can be reproduced, and so on alternately for a number of times. Then, when the tank is clear, with an excess of acid, let fall a few drops of a solution of ferrocyanide of potassium from a small pipette, and rich red curdled clouds of ferrocyanide of copper will form with a beautiful appearance.

2nd Experiment. Having rinsed the tank, or taken a fresh one with water in it as before, add to this some solution of litmus, until the whole acquires a purplish blue tint. Now throw in very gently a little very dilute acid, and allow it to diffuse. On the screen will appear the image of a beautiful sunset sky, with its changing tints of drifting clouds.

When all has changed to red, add ammonia, and so reverse the change, which may then be repeated.

This experiment may be varied in a very beautiful manner. Having filled the tank with the litmus solution, which should be carefully neutralised, introduce at each end two wires from a small battery. Commencing round the one point, the solution will gradually redden, while at the other it will assume a blue tint.

3rd Experiment. Proceed exactly as in the last case, but with a solution of cochineal in place of litmus. The red colour will then be changed by the acid to a brilliant yellow, and by ammonia to a rich purple.

4th Experiment. Into a tank of water drop slowly a strong solution of the acid perchloride of tin. This on the screen will resemble the eruption of a submarine volcano.

When a pretty strong solution has thus been made in the tank, put in a strip of sheet zinc, and long leaf-like blades of metallic tin will at once be seen to shoot out in all directions.

5th Experiment. Make a concentrated solution of crystals of urea in alcohol of about 95 per cent. (The common 85 per cent. alcohol will not answer). Let a few drops of this fall on a glass plate, and with the finger spread it rapidly over the surface, and then at once place it as an object in the lantern. After about a minute, blow gently on the plate with the bellows (not with the breath), and at once on the screen will be seen the growth as of frost crystals, shooting over the field in all directions.

6th Experiment. Fill the tank with a solution of nitrate of silver, and send through it as in Experiment 2, a current of electricity: from one of the wires a beautiful silver tree will immediately begin to grow. The experiment may be varied by substituting acetate of lead for a lead tree.

The coheson figures known as Tomlinson's make a very beautiful effect on the screen, one of the most pleasing being obtained as follows:—

7th Experiment. Fill the tank with ordinary methylated alcohol, and then drop slowly down the side of the tank a small quantity of some aniline colour (Judson's sixpenny bottle answers extremely well); the effect is that of a tree springing from the bottom of the screen and shooting out into endless branches. By using two or three colours, the mingling of them adds much to the effect.

8th Experiment. By substituting fusel-oil for dye, and paraffin for the alcohol, an entirely different form is produced.

9th Experiment. By filling the tank with a saturated solution of Glauber's salts, or hyposulphate of soda, and allowing it to cool, it will appear transparent on the screen, but by dropping one small crystal into it the whole mass will be seen to shoot out into beautiful crystals.

The crystallisation of many other substances, such as bichromate of potash, alum, &c., and the precipitation of iodides of silver, mercury, and other salts, all form beautiful objects on the screen.

The prismatic spectrum may be beautifully shown with the Sciopticon, either in the regular form or that of a rainbow. The latter is produced by placing, instead of the ordinary slide, a piece of card having a slit a sixteenth of an inch cut in it in the form of a bow. By using two lanterns, and with one throwing a view on the screen and the other the bow, a very natural effect is produced.

By coating a glass with a mixture of gelatine and chloride of cobalt, this when placed in front of a slide, will give a rosy effect to the picture, which, however, from the effect of the warmth of the lantern, will gradually change to purple and then to blue. On becoming damp again it will resume its red colour, and can be used over and over again.

A number of beautiful effects, showing complimentary colours, may be obtained with the Sciopticon. If we insert a piece of green glass, having any design cut out of black paper and pasted on it, we shall see on the screen a black design on a green ground; but by bringing another light into the room or turning up the gas, the black design will at once appear to the eye as a brilliant pink. A solution of coloured liquid in the trough is best, as its density can be regulated. A weak solution of permanganate of potash takes as complimentary colour a vivid green. These experiments can be varied by using different colours, such as blue for yellow, &c.

The effect of what is known as the "Fairy Fountain" can be prettily illustrated in the following manner:—A small table fountain is placed at a distance of about four feet in front of the lantern; by curtains or otherwise the lantern is then hidden from the audience, so that they see only the fountain illuminated by the rays coming from the lantern When the fountain is made to play, every drop seems transformed into a diamond, and by passing coloured glass in front of the lantern the effect is striking and beautiful; but when the rays from a bisulphide of carbon prism are allowed to fall on it, then is the best effect produced.

An experiment easy to perform, and always interesting, is the development of a photograph on the screen. For this we require a tank with one of its faces of yellow glass, which side should be next the condenser. Place a small statuette in the rays of the lantern, and having prepared a small plate with collodion and sensitised it, expose in the camera for about a minute; then, having filled the trough with developing solution, place in it the slide, and as the development proceeds the image will gradually appear on the screen. A transparency might then be made from this, and, after drying, shown on the screen thus illustrated the formation of a photographic lantern slide.

These few experiments will show what a wide field lies open for demonstrating all sorts of optical, chemical, electrical, and other phenomena, giving us the means of amusing and instructing our friends at the same time. A much more extended list of experiments will be found in "*Science at Home*," by W. B. Woodbury, reprinted from the English Mechanic.

PHOTOGRAPHIC TRANSPARENCIES.

All photographic views may be used in the Sciopticon, but the most suited are those produced by the Woodbury process, and known as the Woodbury lantern slides. These owe their superiority to the fact that, unlike those produced by photographic processes, the blacks are transparent colour; while the deposit of metal in the ordinary albumen or collodion slides obstructs too much light, and so does not give so brilliant an image.

The accompanying diagrams give the exact size and appearance of them.

WOODBURY PHOTO-RELIEF EXCELSIOR LANTERN SLIDES.

By John C. Browne, of Philadelphia, U.S.

While it is a comparatively easy matter to produce fine positives by either the wet or dry process of photography, yet the results are liable to vary somewhat even in the hands of the most careful manipulator. The Woodbury photo-relief process, as now worked in Philadelphia, has the merit of distancing all competition in the uniform excellence of its lantern slides. It would be a pleasure to give in detail a description of this wonderful process, did space permit, commencing with the sensitive gelatine tissue, resembling in appearance a piece of patent leather, and following it in its exposure to light under a negative, the light's action rendering insoluble those parts reached through the negative; its subsequent immersion in hot

water dissolves out those parts not rendered insoluble, producing a relief as thin as writing-paper, which when dry is pressed into a piece of soft metal by a hydraulic press of fabulous power, forcing this delicate substance into the smooth metal, and leaving upon its surface a counterpart or mould of all its finest lines and half tones. Strange to say, this flimsy gelatine relief is not crushed to atoms by this treatment. It is not damaged in the least, but ready to make its mark again as often as it is necessary.

This leaden mould is the type that prints the picture, a solution of gelatine and India-ink being poured over it before the glass is placed in position.

A slight pressure is given in a press of peculiar construction, squeezing out the surplus ink; a few minutes is allowed the ink to set, when the glass, being removed, brings with it the delicate gelatine picture, which is well named "Excelsior."

LECTURE ON THE SCIOPTICON.

The following instructive lecture, written for and delivered before the Conversazioné of the Literary and Philosophical Society of Leeds, December 1st, 1874, by WASHINGTON TEASDALE, Esq., will give a good idea of the *Sciopticon's capabilities:*—

"Mr. President, Ladies and Gentlemen,—I have the pleasure this evening to introduce to your notice, the most charming and effective piece of educational apparatus it was ever my good fortune to possess. A year's experience of its merits, superadded to fully thirty years' experience of the shortcomings and imperfections of its predecessors, enables me to advocate its merits with no ordinary confidence.

"All the optical instruments hitherto used for the purpose of projecting upon a screen the enlarged image of a small transparent picture, by means of a light placed behind it, and

consisting of a lens or combination of lenses, to concentrate as much as possible of that light on the picture, and other lenses to suitably distribute those concentrated rays to the screen on which the effect was to be made apparent, with certain clumsy framework for holding them in position, have been and still continue to be known under the (I trust obsolete) name of 'Magic Lanterns.' All so-called Magic Lanterns were, etymologically speaking, Sciopticons, which means casters of shadows and all pictorial representations produced by them, chromatic or monochrome, are shadows and nothing more. The appropriate name Sciopticon has happily been given to this latest and best form of lantern, and in it I recognize alike emancipation from all its ungainly, troublesome predecessors, and a suitable designation by which to class it with our most useful scientific instruments. The *form* of the instrument is novel and peculiar, but this peculiarity is in mechanical construction alone, for optically it in nowise differs from the old forms of lantern, and although so small and compact, I may tell you that its lenses are larger and more perfect than those usually employed, and capable (if the oxyhydrogen light were used) of showing as large and brilliant pictures as any you ever saw. To-night, however, I do not show it as a brilliant, sensational novelty, for effect in a large hall, but solely as the most convenient and portable lantern ever made for educational purposes. As at present arranged, the *illuminating power*, on which alone depends the size and brilliancy of the picture (the lenses merely ensuring desirable accuracy and efficiency), consists of a double-wick petroleum lamp, most ingeniously contrived to burn with perfect safety and exceptional steadiness for several hours without requiring the least attention, thus leaving the exhibitor free to devote his whole attention to the subject he may be lecturing upon, an advantage the experienced alone can estimate or appreciate. To point out and explain all the excellencies of this charming little instrument, would require a special lecture and the devotion of a whole evening to the subject, and this I am willing to do, if those interested in popular education will

arrange a special meeting for the purpose. At present, suffice it to say, that it is packed in a neat small case, which can be easily carried in the hand; it can be taken out and set up in action in less than five minutes, and, when the lecture is over, can as soon be packed up. The cost in petroleum to shew it for an hour-and-a-half every night is 6d., or at most 8d. a week. The wicks last a full season without requiring any trimming. With ordinary care nothing need get out of order, and altogether it requires a very minimum of attention, far less, indeed, than any ordinary microscopic lamp, in lieu of which I frequently use it now. The Sciopticon itself is capable of being used as a demonstrative microscope, for shewing simultaneously to a number of people a collection of transparent slides of insects, mounted whole or in parts, wood sections, &c."

THE SCIOPTICON FOR ENLARGING.

Among the various uses that the Sciopticon can be put to is a very important one, viz., that of enlarging from small carte de visite portraits to life size. In the hands of Mr. Brothers, F.R.A.S., and Dr. Liesegang, of Dusseldorf, it has been found to answer in every respect. An article read by Mr. Brothers before the Manchester Photographic Society is here appended:—

"An artificial light suitable for enlarging photographs has long been a desideratum amongst photographers. The oxy-hydrogen light is used successfully, but the trouble of making the gases has always been a serious inconvenience. The electric light is, perhaps, the most suitable; but the inconvenience attending its use are greater than with any other kind of artificial light, and so restrict its application to photography.

"The magnesium light at one time promised to be of the greatest service to photographers, and it is no doubt one of the simplest forms of artificial light. There are objections to its use, and chiefly that of the expense of the magnesium and the necessary apparatus; the brilliancy of the light is only surpassed

by the electric light. The magnesium light has this advantage over all other kinds, that it is very portable, and can be used in cases—such as the illumination of interiors—when no other artificial light could so conveniently be used. It is also very useful in portraiture, as some of the most artistic effects may be obtained by its use.

"But I am chiefly concerned this evening in directing your attention to a new form of apparatus for enlarging. The cost of the apparatus has hitherto been the chief objection to the use of any artificial light for enlarging photographs; but this objection can be said no longer to exist, as the Sciopticon will be found to be one of the cheapest and handiest of instruments yet introduced. You have all seen what this little instrument will do when used as a magic lantern: I have now the pleasure to exhibit two enlargements made with it.

"It is unnecessary to describe the proper arrangements for working an enlarged negative, as everyone here must be fully cognisant of all that is required. I have only to add that the exposure was one minute; and at this season of the year—in the ordinary light of a December day—the exposure would have been about the same."

"A. Brothers, F.R.A.S."

ILLUSTRATING LECTURES.

By W. B. Woodbury.

[From the *British Journal Almanac.*]

"A Lecturer often requires to make a diagram in a hurry for exhibiting in the lantern. I have found an excellent medium formed by making a varnish of dammar in benzole of the ordinary consistency, and adding a few drops of india-rubber in the same solvent.

"This dries perfectly transparent, but allows of the finest writing being made on it by means of a steel pen and indian-ink. When circles are required, a centre may be obtained for

the compasses by damping a piece of card and attaching it, removing it when done with.

"By coating mica with this, all sorts of designs may quickly be traced from any scientific work.

PHOTOGRAPHY.

GLASS POSITIVES FOR THE MAGIC LANTERN.

By John C. Browne.

"Few entertainments for the amusement of children, as well as persons of mature years, give more real pleasure than exhibitions of the magic lantern. It is a never-ending source of pleasure, and doubly valuable to the disciple of photography, who by the aid of a few chemicals and very simple apparatus, can prepare interesting slides of local interest that will delight the home circle, and fully repay the small expenditure of time required for their manufacture. Every photographer has among his negatives many subjects, both portrait and landscape, that when printed on glass will prove effective pictures for exhibition.

"The object of this paper is to give in as few words as possible, plain directions for making positives on glass, suitable for the magic lantern.

"Either the wet or dry process can be used. The former is more applicable in cases where it is necessary to reduce a negative to the proper sized positive required for the lantern. The dry method is used to advantage when the negative is of small size, and can be printed in contact. As all photographers are familiar with wet manipulations, we will consider that process first.

"The only apparatus actually required, is an ordinary camera and lens, placed upon a board six feet long, in front of which a negative is fastened. This negative is simply copied upon a sensitive collodion plate, that is exposed in the camera, carried into the dark-room, and developed, fixed, and toned.

"It may seem to the reading photographer, unnecessary to burden this article with a complete chemical formula for making glass positives, but as it is prepared expressly for the uninitiated, it would be unintelligible without a formula.

"*To make 8-oz. Sensitive Collodion.*—Alcohol 5-oz., ether 3-oz., iodide of ammonium 44-grs., bromide of magnesium 20-grs., cotton (Parys') 35-grs. Before using, filter several times through cotton soaked in alcohol. It is a good plan to keep a supply of plain, unexcited collodion on hand, as a stock-bottle; also, a bottle of exciting solution, made in the proportion of iodide of ammonium 5 grains, bromide of ammonium 2½ grains, to the drachm of alcohol. By adding 1 drachm of the solution to 1 ounce of plain collodion, it will be excited to the proper condition.

"*Nitrate Solution.*—Water 1 ounce, nitrate of silver 40 grains; make slightly acid with nitric acid, C. P. Iodize the solution by allowing a plate coated with excited collodion to remain in it over night. Filter.

"*Developing Solution.*—Make a saturated solution of ammonia, sulphate of iron (in water); filter. To every ounce of this solution add glacial acetic acid, 1 drachm. This can be used as a stock solution, and will keep an indefinite length of time in good condition. Crystals will form in the stock-bottle, after standing some hours, but that is of no consequence, as the strength of the solution is correct.

"In developing a plate, use 5 drachms of water to 2 drachms of ammonio-sulphate of iron from the stock-bottle. During hot weather use ice-water to retard the action of the developer.

"*Fixing Solution.*—Cyanide of potassium or hyposulphite of soda; either will answer, but the action of cyanide appears to make a somewhat brighter picture.

These solutions being carefully prepared, the picture accurately focused, the negative (collodion side towards the lens) covered with a dark cloth, prepare the plate in the dark-room, in the usual manner, place it in the dark-holder, in the position of

the ground-glass, draw the slide (the lens is always uncovered), remove the cloth from the negative for a few seconds. The exposure will then be made. Cover the negative, shut the slide, and remove to the dark-room for development. The picture should appear slowly; not flash out upon the first application of the iron solution. Over exposure, as well as over-development, are both fatal to transparencies. No trace of fog should be visible. From five to fifteen seconds will be found sufficient, on a bright day, with a negative of ordinary strength, and the chemicals in good order.

"*The Negative.*—Must be *sharp*, of good printing density, and as free as possible from all defects. As the magic lantern slide is generally $3\frac{1}{4} \times 3\frac{1}{4}$, it is not desirable to employ a very large negative. $6\frac{1}{2} \times 8\frac{1}{2}$ will answer the purpose better than a larger size. But negatives upon smaller glass will be found to give even finer results. On the other hand, it is very bad policy to attempt to enlarge a positive to double or treble the size of the original negative. The negative should not be smaller than the positive.

"*The Lens.*—Any good partrait combination, of six to eight inches focus, quarter-inch stop, will work to advantage. Lenses of very short focus and very small opening, are not recommended.

"*The Development*—Should be conducted with great care and judgment, as it is the most important part of the whole process. Rather underexpose and underdevelope, and as soon as the detail is visible, flood the plate with water, and check further action. Avoid an excess of light during development, and dread the appearance of the slightest fogging as the worst enemy to be encountered.

"*Fixing Solution.*—Cyanide of potassium, after which wash well in running water.

"*Toning.*—It is frequently of benefit to the positive that it should be toned, and at the same time slightly strengthened, to give contrast to the picture when projected upon the screen by a powerful light. Many chemical solutions may be used to accom-

plish this purpose. A weak solution of gold gives good results; also, a dilute solution of bichloride of palladium can be recommended. In either case the solution is flowed over the plate, after fixing. The positive is then dried and varnished.

"*The Finished Picture*—Should be free from the slightest appearance of fog; the high-lights, the sky in landscapes (except when clouds are present), perfectly clear glass. The particular tone requisite to suit the positive, is a matter of taste. A warm sepia will be found suitable for most transparencies; but each operator must exercise his own peculiar feeling in this matter.

"In making positives to be exhibited by the magic lantern, it is well to consider the variety of light to be used in projecting the picture upon the screen. Where powerful illumination, such as the oxy-hydrogen or magnesium lights are used, positives may be made slightly stronger, showing more contrast than where a weaker form of illumination is employed.

"The slides should be protected from scratches and dust, by a piece of clear glass of the same size, neatly pasted on the edges with muslin.

"Positives on glass can also be made by the wet process, from negatives of the proper size, by pasting a thin strip of cardboard upon two edges of the negative (collodion side). The sensitive plate is prepared as usual, and is placed, while in the dark-room, in close contact with the negative, separated only by the cardboard. It is then exposed behind the negative, to diffused sunlight or artificial light, for a few seconds, returned to the dark-room, and developed. This plan admits of no change in the size of the negative.

"The proper size for glass pictures to be used in lanterns of convenient proportions, is a debatable subject. Glasses of $3\frac{1}{4} \times 3\frac{1}{4}$ being generally used, but advantages are claimed for a slide $3\frac{1}{4} \times 4\frac{1}{4}$, that have some weight. In placing this slide in the lantern, the additional length of the glass allows the corners to be held by the thumb and forefinger, without being visible upon the screen, as is sometimes the case with the square slide. Then again it is easier to place in its proper position (right side up), having only one chance of error instead of three."

A DRY PLATE PROCESS FOR LANTERN SLIDES.

TANNO-GALLIC PRESERVATIVE.

"In considering the dry process, it is but proper to say that a large number of different formulæ have been published; in fact, scarcely half a dozen photographers think alike on this subject. It is, therefore, impossible to give a formula that will give universal satisfaction. In preparing this paper for publication, it must be distinctly understood that nothing new in the way of preservative or development is claimed; it is simply one of the many methods for preparing dry plates that has given reliable results.

"The dry-plate photographer must be prepared for many and great failures, and be possessed of the greatest amount of patience and nicety of manipulation, for otherwise time is wasted, and the best process voted a failure. Commence with reliable chemicals, and follow up the process with a lavish expenditure of water when washing is mentioned, not only on the collodion plate, but thoroughly rinse the various glasses and dishes, and particularly the *fingers*, between each operation. Use as little light as possible when making or developing dry plates, and be careful that the light is yellow.

"Probably more dry plates are ruined, and the particular process used condemned as worthless, by the use of white light than from any other cause. A square-sided lantern, having the white glass removed, and yellow substituted, will be found very convenient; either gas, a candle, or kerosene can be used for illumination.

"To prevent the collodion film slipping from the plate during the process, it is absolutely necessary that the glass plate should be albumenized. Wash the glass (having previously roughened the edges) drain, and while wet flow over it the following solution:

Albumen (the white of an egg)	1 egg.
Water...	1 pint.
Concentrated Ammonia	10 drops.

"Put the albumen in a clean bottle, then add the water. Shake a little, and add the ammonia; filter through a sponge; dry in a rack.

COLLODION.

"Any reliable collodion will answer; it is best to have it quite thick. No backing is necessary.

NEGATIVE BATH.

Nitrate of Silver	45 grains.
Water	1 ounce.

"Made slightly acid with nitric acid C. P. Dip the collodionized plate in the bath, and when properly excited, remove the plate, and dip in a bath of pure water; then wash under a tap with running water. While wet apply the

PRESERVATIVE SOLUTION.

Tannin	10 grains.
Gum Arabic	6 ,,
Sugar	4 ,,
Water	1 ounce.

"Filter, and add one drachm per ounce of

Gallic Acid	24 grains.
Alcohol	1 ounce.

"The preservative must be fresh. Three ounces of this mixture will prepare half a dozen $6\frac{1}{2} \times 8\frac{1}{2}$ plates.

"If the preservative is poured over the plate, apply twice, working it well into the film; throw the first *dose* away, and use the second flowing for the first application to the next plate.

"The plates must be carefully dried, either by natural or by artificial heat; a hot-water bottle will be found useful for that purpose should artificial heat be thought best.

THE EXPOSURE

"Will depend upon the strength of the negative, and the nature of the light; a few seconds will generally be enough. *Close contact* is absolutely required to produce sharp positives. An ordinary printing-frame can be used.

TO DEVELOPE

"In a dark room, remove the dry plate from the frame, place it in a dish, and flow over it

Alcohol	} equal parts.
Water	

"Then wash in running water.

DEVELOPING SOLUTIONS.

Pyrogallic Acid	2 grains.
Water	1 ounce.

"Made from a stock bottle of

Alcohol	1 ounce.
Pyrogallic Acid	96 grains.

"Five minims of this solution contains one grain of pyro.

ALKALINE SOLUTIONS.

Carbonate of Ammonia...	64 grains.
Water	1 ounce.
Bromide of Potassium	4 grains.
Water	1 ounce.

"Mix together.

"After the plate is well washed flow over it a solution of

Pyrogallic Acid	2 grains.
Water	1 ounce.

"Then pour back again into the measure. Should the image be developed by this solution, proceed very cautiously, and add a few drops of the alkaline solution of carbonate of ammonia and bromide of potassium. If the picture comes out slowly, add more of the alkaline solution up to thirty drops, if necessary, and also a sufficient amount of stronger pyro to bring out all the detail. When the image is out, wash with water, and intensify with

Pyrogallic Acid	2 grains.
Water	1 ounce.

"To which is added ten drops of citric acid and nitrate of silver solution.

Citric Acid...	30 grains.
Nitrate of Silver	20 „
Water...	1 ounce.

"This is a stock bottle. Mix in separate glasses; add together and filter; wash.

FIXING SOLUTION.

"Hyposulphite of soda.

TONING SOLUTION.

"The same remarks applied to wet positives will answer for toning dry plates."

SCIENCE AT HOME.

Communication from the President of Franklin Institute,

"To Mr. L. J. Marcy, Philadelphia.

"Dear Sir: During the winter of 1872-73, I was interested in lantern experiments, using the lime light as the source of illumination. At the same time I made frequent use of your very admirable Sciopticon, with oil lamps. The readiness with which it can be adjusted and made ready for use impressed me. For parlor use, as a magic lantern, I very much preferred it on this account, to the more troublesome lime light. Its convenience recommends it as an adjunct to the school-room and I found that very many of the most interesting experiments in physics, usually shown in a lantern, can be readily performed with the Sciopticon. My good friend, Prof. Henry Morton, of the Stephens Institute of Technology, in Hoboken, has already described many of these experiments in your manual. I have told you how I have repeated many of them with very little expense in the way of apparatus, and I would now suggest to the would-be purchasers of your lanterns, that should they desire to use it as an adjunct to the lecture table, they need not be alarmed at the expenditure needed to procure all the fixtures required to perfect it. One of the chief pleasures in its use is in the improvising of what is needed. Those who have long purses may prefer to purchase all needed pieces of apparatus, ready-made to their hand, but a few hints may serve to show how they can, with very little skill, prepare what will answer their purpose. As an illustration, let me recall the very pretty experiment usually called the broken arrow, which is shown to illustrate refraction. As an object in the lantern, a brass plate having an arrow-shaped opening in it (procurable at the instrument makers) is put in place, this throws upon the screen a white arrow on a dark ground; now, if in front of the brass plate a strip of thick glass, narrower than the length of the arrow, be held parallel with its surface, no distortion of the arrow image

will be seen; but if the glass be inclined so that the rays of light pass through it obliquely, a piece of the arrow will seem to be cut out and be moved to one side. This is a striking illustration and can be improvised quite readily, as follows: Procure some slips of good window glass, of the size used for magic lantern slides (I prefer 3 × 4), some tin-foil, such as paper-hangers paste on damp walls before papering, and some paste made of gum tragacanth; with a sharp knife, laying the foil on a plate of glass, the arrow shaped opening can be readily cut, and its edges will be as smooth as the most skilful mechanic can make a brass plate. This foil, so prepared, should be mounted between two slips of glass, and the edges bound with paper. Gum tragacanth will cause paper to adhere to glass very firmly, and is a nice, clean paste to use. The slide thus prepared will be found to be quite as good as the most costly one procurable in the stores. In my own experiments, when I require slits or openings of any required shape, in opaque plates, I have invariably made them in this manner, with a feeling of satisfaction at their cheapness.

"A very convenient device to show wave motion can be made with this tin foil. One slide is made with plates of glass, 3 × 4 inches, having tin foil inclosed, in which slits are cut cross-ways, say $\frac{1}{16}$ inch wide, 2 inches long, and the slits placed $\frac{1}{8}$ of an inch apart. I have sometimes pasted slips of tin foil $\frac{1}{8}$ of an inch across the plate, at equal distances, say $\frac{1}{16}$ of an inch, in preference to cutting them in a solid piece of foil. This slide will show vertical bars of light on the screen. If now another slide be made of two glasses, 3 × 6 inches, with foil between them, in which foil a wave-like opening be cut, say $\frac{1}{8}$ of an inch wide, this slide of itself would show in the lantern a wave line of light on a dark ground on the screen. The two slides put together in the lantern will show a wave line of dots, and if the wave-line slide, which is twice as long as the one with bars, be moved back and forth in front of the bars, the dots will seem to rise and fall in wave motions, and the fact will be demonstrated, that in wave motions there is an advancement of the wave,

while the individual particles only rise and fall without advancing.

"The slips of glass, mentioned above, can be conveniently prepared for drawing diagrams, by coating one side with plain collodion (gun cotton dissolved in equal parts of alcohol and ether); when dry this surface takes India-ink admirably, and diagrams can be traced, or pictures copied in a rough way, by laying the glass plate so prepared over the picture to be copied and tracing its outline with a pen filled with good India-ink.

"The tank figured in your manual, in Chapter VII., on Chemical Experiments, contributed by Prof. Morton, can be made to do service in a long line of experiments with electricity, by a very simple device. Thus, to illustrate the decomposition of water, cut a slip of segar-box wood, of a size that will lay on the bottom of the tank loosely, attach to this bit of wood copper wires, which will extend up to the end of the tank and will not quite meet at the centre of the bit of wood; to upturned ends at this place, solder little slips of platina foil, $\frac{3}{4}$ inch long by $\frac{1}{4}$ inch wide, they must stand vertically face to face, about $\frac{1}{2}$ inch apart. Now coat the copper wires and the wood with melted paraffine, but take care that none gets on the platina; this will insulate the copper wires and prevent the wood from absorbing any moisture. This little frame placed in the tank, immersed in acidulated water (water with a few drops of sulphuric acid), and the terminal wires attached to say two cells of Groves' battery, will show the decomposition of water admirably. A similar piece of apparatus with the terminal wires at the centre of the board, united by a vertical coil of very fine platina wire, will be found useful in illustrations of circulation by heat. Such a frame immersed in clear water will be seen on the screen as a black coil, seemingly hanging down from a black bar on the top of the screen; if now, by means of a pipette, some colored fluid, say a solution of permanganate of potash in water, be carried to the bottom of the tank, it will on the screen seem to spread itself out as a red stripe under the black one and enveloping the little coil; a current of electricity

passed through the wire will heat the little platina coil and thus heat the water in contact with it, so that currents will be established in the fluid, carrying with them the colored fluid in a very beautiful curling cloud of color.

"I mention to you these few examples, of how readily the needful appliances for illustrations can be improvised; now I have frequently heard persons say that they 'fear the expense entailed in the use of a lantern,' that 'the lantern is so useless without a great many accessories, which are so expensive in themselves.' Feeling a lively interest in your very meritorious invention, I have volunteered these hints, which I beg you will, if you see fit, use to your benefit.

"Very truly yours,

"COLEMAN SELLERS."

EXTRACTS FROM THE PRESS, AND TESTIMONIALS.

"An instrument which provides entertainment of an amusing and instructive character in one's own parlour should be especially welcome to the majority of the readers of this journal, inasmuch as they live mainly in detached places at considerable distances from large towns. An American, named Marcy, has lately brought out, in connection with Mr. Woodbury, of Greenhithe, Kent (well known as the inventor of the Woodbury process in photography), an apparatus of the magic lantern type, but which will in all probability supersede the old lantern altogether. It is called the Sciopticon, and a glance at it is sufficient to show its great improvement on the clumsy old oil lantern, with its disagreeable smoke and smell, and its advantages in compactness, cost, and ease of manipulation, as compared with the troublesome and expensive oxy-hydrogen apparatus. By an ingenious construction and arrangement of the lenses and reflector, a light of great power and brilliancy is obtained from a small lamp, burning paraffin, the peculiar application of which prevents all chance of danger."—*Chamber of Agriculture Journal*, January, 1874.

REPORT OF THE MANCHESTER PHOTOGRAPHIC SOCIETY, NOVEMBER, 1873.—"At the close of the lantern show (oxy-hydrogen) the Secretary exhibited a Sciopticon. This instrument was first tried at *the same distance from the screen as the oxy-hydrogen lantern*, with a very satisfactory result, the pictures being uncommonly well illuminated, while the instrument itself excited the greatest interest."

Report of the Edinburgh Photographic Society.—"At the conclusion of the exhibition, Mr. Ross expressed his great satisfaction with the work done by the Sciopticon. It was not, he said, suited for exhibitions in large halls; but in small schools, or drawing rooms it was an admirable instrument—in fact, very much better than any oxy-hydrogen lantern, the delicate texture of some of the best pictures, which was lost in the blaze of the latter, being fully brought out in the former."

Manchester Photographic Society.—The Sciopticon was used by the members for trying a number of slides, and retained its previous popularity."

"The Sciopticon is an improved form of magic lantern, and a very decided improvement too. It takes a place midway between the old fashioned magic lantern and the troublesome and costly lanterns which employ the oxy-calcium or oxy-hydrogen light as the illuminating medium. But, apart from the advantages pertaining to it in connection with the illumination, the alteration in the shape of what we may term the 'object chamber,' is a vast improvement, facilitating as it does the exhibition of other and very different 'slides' to those which are alone suitable to the older forms of magic lanterns."—*English Mechanic*, October 31st, 1873.

"The illumination was unquestionably more brilliant than that obtained by any of the ordinary lanterns with oil."—*Photographic News.*

"Need has long been felt for some form of the magic lantern having a strong light, but more easily produced than any of those just mentioned; and this has at last been accomplished, after several years' study and experiment, by Professor L. J. Marcy. The Sciopticon is the name of his new instrument, and from actual trial we find that it possesses many superior qualities. Its lenses are excellent, and in illuminating power its light ranks next to oxy-hydrogen. The Sciopticon light is produced from ordinary coal oil, by an ingenious arrangement of double flames, intensifying the heat and resulting in a pencil of strong white light. Professor Marcy's instrument is the perfection of convenience, simplicity, and safety. Any one may successfully work it, and produce the most brilliant pictures upon the screen. It is particularly adapted for school purposes and home entertainment. Those who wish to do a good thing for young people should provide one of these instruments."—*Scientific American.*

"We have witnessed a number of experiments with this lantern, and can fully endorse it as a great advance upon anything before used in the shape of a lamp-illuminated magic lantern. For a parlour or school exhibition it may well take the place of the far more troublesome oxy-calcium lantern, which it rivals in efficiency. There are many details of construction which are of very ingenious and efficient character, among which we would specially notice the slide for pictures, by which, one picture being in use, another may be removed and exchanged, and then, by a single movement, brought into the field, while the other is in like manner ready for substitution."—*Journal of the Franklin Institute.*

"The great efficiency of the Sciopticon, as compared with any other lamp-illuminated lantern, together with its simplicity, symmetry and compactness; its

safety, convenience, and fitness for slides of every variety, and for various philosophical experiments; makes it unrivalled for home and school purposes. I would not want to be without a Sciopticon in my house. It gives one such enlarged views of everything."—*Philadelphia Photographer.*

"I like the Sciopticon very much, and use it to illustrate my lectures. When the audience is not large, the light is sufficient for almost all purposes. It is the best instrument of the kind I have ever seen."—*Professor Rood, of Columbia College.*

THE SCIOPTICON.—A correspondent having asked our opinion concerning the 'Sciopticon'—a new instrument introduced by Mr. Woodbury at the last meeting of the South London Photographic Society—we have to reply that it has very much to recommend it. The shape is pleasing, somewhat suggestive, at first sight, of a miniature locomotive engine; the bulk is very small; the peculiar construction of the lamp causes it to yield a powerful light, with a flame that is free from smoke; and the disc on the screen, when we saw it on the occasion above referred to, was well illuminated."—*British Journal of Photography,* January 31st, 1873.

"I have made some demonstrations with the Sciopticon, and it is the best Laterna Magica I ever saw. It seems perfect in every respect."—*Romain Talbot, Optician, Berlin.*

"We are charmed with the instrument and views."—*J. B. Yonge, Esq., Ottenbourne House, Winchester.*

"The Sciopticon is a great success. Let me have another soon."—*G. Davies, Esq., Manchester.*

"I have a very high opinion of the Sciopticon, which is shared by all my friends who have seen it; the light is splendid, not to mention the advantage of being able to use it for scientific purposes."—*George Little, Esq., Plumstead.*

"The simplicity, certainty, and intensity of the light by your arrangement is most satisfactory, conducing much to the success, and consequently pleasure, of an exhibition."—*J. W. Stidolph, Esq., Dartford.*

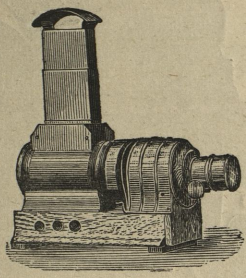
"I have bought one of your double lanterns and am delighted with it. I consider it a great success."—*Edmund Gill, Esq., R.A., Lime Villa, Sutton.*

"The Sciopticon gives in practice a far better light than any other lamp I know; the lantern also is more convenient than the ordinary form in several ways."—*Rev. Charles Taylor, Trinity Vicarage, Folkestone.*

"I have bought one of your double lanterns and am delighted with it. I consider it a great success."—EDMUND GILL, Esq., R.A., Lime Villa, Sutton.

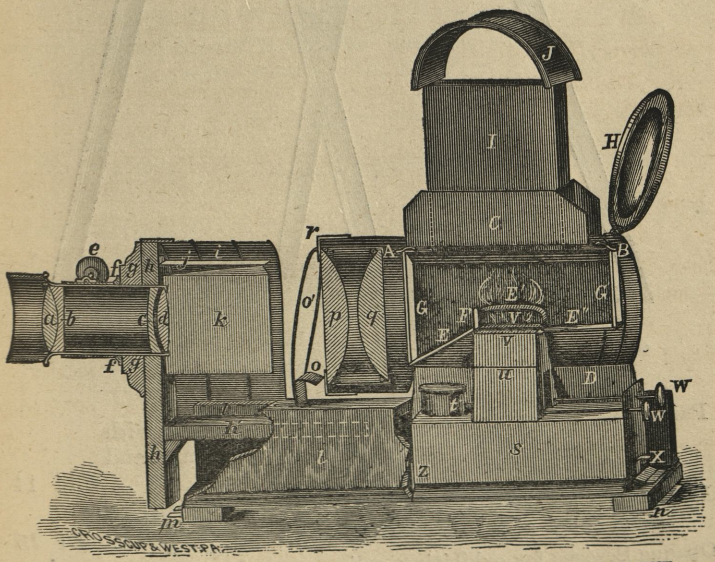
"The Sciopticon gives in practice a far better light than any other lamp I know. The lantern also is more convenient than the ordinary form in several ways."—REV. CHARLES TAYLOR, Trinity Vicarage, Folkstone.

PRICE LIST.



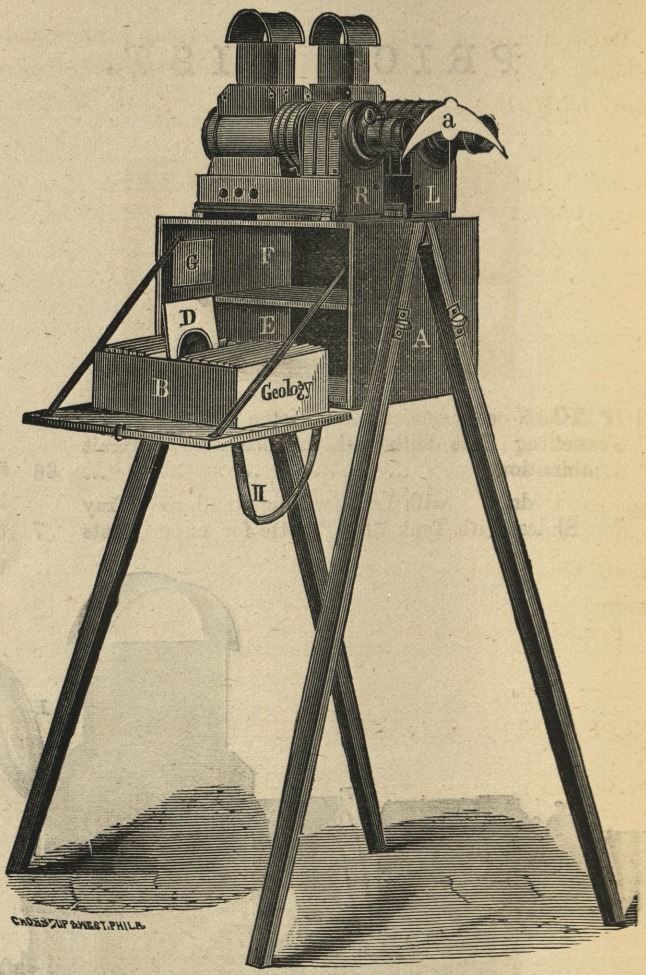
SCIOPTICON complete, in handsome stained wood Travelling Case with lock—Achromatic Portrait combinations £6 6 0

Do. do., with Legs forming stand, and Tray for Slides, with Tank and Pipette for experiments 7 15 0



SECTIONAL VIEW OF SCIOPTICON, SHEWING ITS INTERIOR ARRANGEMENT.

N.B—The Case holding the single Sciopticon measures only 15 × 11½ × 6½. The Lenses being Achromatic, can be used for taking "Carte de Visite," Stereoscopic Views, &c.



Pair of Sciopticons arranged for dissolving effects, with tray to hold slides, handles, lock and key, tank and pipette, complete	£14 14 0
Microscopic attachment, with two powers, made to fit same flange as the Sciopticon lens	£1 15 0
Opaque Screens for exhibiting, calico covered with white paper and ornamental border, complete in case—	
6 feet square	£1 0 0
8 „	1 5 0
10 „	1 15 0
Drawing Paper, 5 feet × 6 feet, for screens	
The Sciopticon Manual, Third Edition	0 1 0

Apparatus for use with the Sciopticon or other Lantern and for exhibiting the experiments described in the articles "Science at Home," by W. B. WOODBURY, published in the *English Mechanic*.

FIG. 1

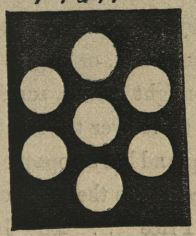


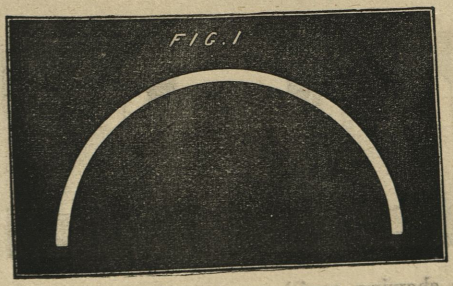
FIG. 2

Sets of 4 designs in colour for shewing the complimentary colours of Red, Yellow, Blue and Green, with plain duplicates, the set	5 0
Single pairs	1 6
Sheets of coloured gelatine, 5 colours, $3\frac{1}{4} \times 4\frac{1}{4}$, the set ...	1 0
Delicate blue tinted slide for Statuary	1 0
Mounted coloured slide of 5 tints for throwing effect on to Fountain, to produce effect known as "Fairy Fountain"	1 0

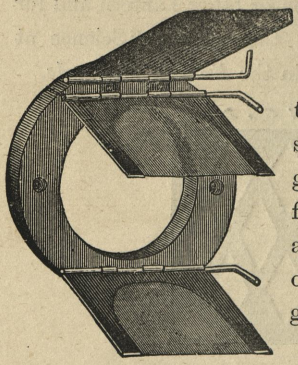
APPARATUS TO SHEW ARTIFICIAL RAINBOW.

Semi-circular metal slit to form the white bow 1 0

FIG. 1



Bisulphide of Carbon prism to shew the spectrum	15 0
Glass ditto	9 0
View of Niagara Falls (coloured) with mist rising, for shewing rainbow effect	5 0
Stalacite slides for shewing prismatic effects with the bisulphide or glass prism	2 0



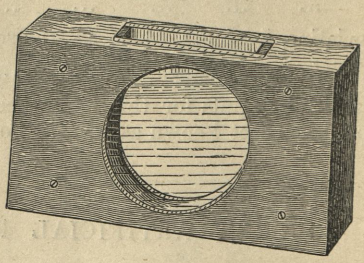
THE SLIDE TINTER.

This apparatus is designed to add to the effect of all uncoloured photographic slides, by giving a double tint to foreground and sky, or to give a general tint for moonlight effects, sunrise, &c. It is adapted to fit over the front lens in place of the cap, and has an opaque shutter which gradually causes the picture to disappear.

Price ... £0 10 0

TANK FOR CHEMICAL EFFECTS.

OAKLEY'S PATENT.



With sheet of non-actinic gelatine to interpose while developing photograph 5 0

FIG. 5

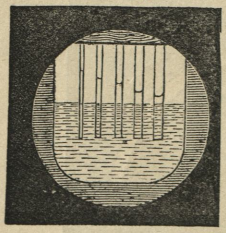
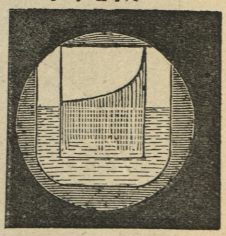
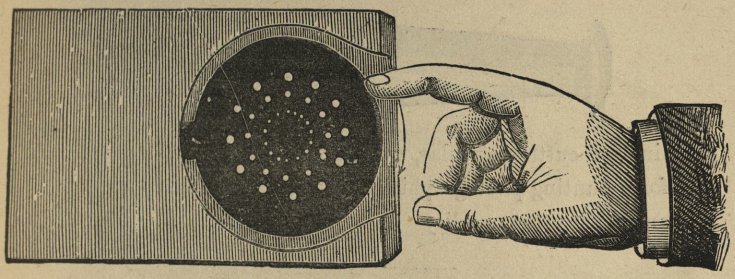


FIG. A



Apparatus for shewing capillary attraction with the Tank, two designs ... ... each 2 6

Pipettes for use with the tanks 2 0



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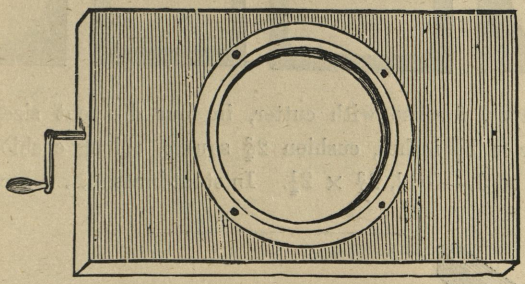
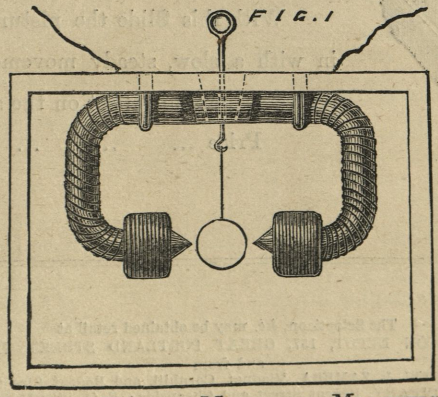
Shewing effect of persistance of vision in a very beautiful manner, producing an endless variety of designs ... 5 0

Extra designs for same 1 0



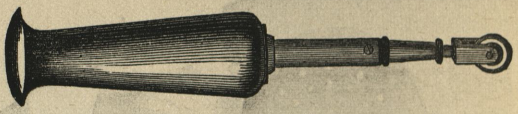
THE INTERCHANGEABLE CHROMATROPE HOLDER for exhibiting Chromatropes, Eidotropes, &c. 5 6

Designs for same ... ... each 2 6

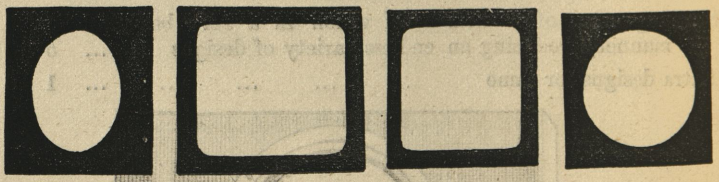


SLIDE for shewing ELECTRO-MAGNETIC, MAGNETIC, and DIA-MAGNETIC experiments, price 13 0

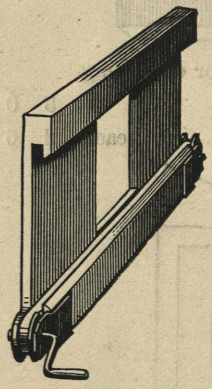
"Science at Home," reprinted from the *English Mechanic*, 1s.



Machine for cutting circular, oval or cushion shaped mounts for mounting photographic slides, with clean sharp edges and with great rapidity 5 0



Metal shapes, for use with cutter, in four different sizes, circles $2\frac{3}{4}$ inches, cushion $2\frac{3}{4}$ square, oblong cushion $2\frac{3}{4} \times 3$.—Oval, $2\frac{3}{4} \times 2\frac{1}{4}$. In stout brass ... each 1 0



THE PANORAMIC SLIDE HOLDER.

HATCH'S PATENT.

With this Slide the pictures are passed in with a slow, steady movement, giving a perfect panoramic effect on the screen.

Price 7 6

The Sciopticon, &c. may be obtained retail at
THE SCIOPTICON DEPOT, 157, GREAT PORTLAND STREET, LONDON, W.
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MESSRS. NEGRETTI & ZAMBRA, Viaduct, Cornhill, and Regent Street; THE LONDON STEREOSCOPIC COMPANY, Regent Street and Cheapside; E. G. WOOD, Cheapside; PAYNE & CHAPMAN, Piccadilly, Manchester; MAWSON & SWAN, Newcastle-on-Tyne; GEORGE MASON, Glasgow; HARVEY REYNOLDS, LEEDS,
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1 The Whirlpool Rapids, with bursting wave (instantaneous)
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7 The Falls by moonlight
8 American Falls (instantaneous)
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10 Niagara River, icebound, No. 1
11 ,, ,, ,, No. 2
12 Above the Horse-Shoe Falls—sunset
13 Ice stalactites, No. 1
14 ,, No. 2
15 Ice pillars
16 The Horse-Shoe Fall (Winter)
17 General view of Falls from under Suspension Bridge
18 Steps down the Falls (Ice scene)
19 Terrapin Tower from below (Ice scene)
20 Prospect Point
21 Terrapin Tower
22 Horse-Shoe from below (Winter)
23 Ice raft
24 King Frost, No. 1
25 ,, No. 2
26 Bridge on Luna Island
27 Ice-decked tree—Luna Island
28 ,, ,, ,, No. 2
29 ,, ,, ,, No. 3
30 Terrapin Tower and Horse-Shoe Falls
31 Ice clouds
32 General view of Falls in Winter
33 Descent to the Falls
No.
34 Snow-covered trees—Luna Island
35 Ice Cavern from within
36 ,, from without
37 American Fall from below
38 The Dressing-room—Niagara
39 Frosted Trees—Luna Island
40 The Falls from Prospect Place
41 ,, Luna Island
42 Interior of Suspension Bridge

CALIFORNIA AND OVERLAND ROUTE.

43 Cathedral Rocks, Yosemite Valley
44 Yosemite Valley
45 The Three Sisters (general view)
46 ,, ,, (near view)
47 The Big Trees, No. 1
48 ,, ,, No. 2
49 North & South Domes, Yosemite
50 El Capitan
51 Inspiration Point
52 Lower Yosemite Falls
53 Upper ,,
54 Our Expedition Party
55 Eagle Peak, Yosemite
56 Mirror View ,,
57 Yosemite Valley, No. 1
58 ,, ,, No. 2
59 Mirror Lake, Yosemite
60 North and South Domes reflected
61 Town of Nevada
62 Union Peak, Yosemite

VARIOUS.

63 The Capitol (Washington)
64 Falls of
65 Falls of Minnehaha, No. 1
66 ,, ,, No. 2
67 Bridge over the Wisahickon
68 Fountain Cave
69 ,, ,, from interior

No.
70 Independence Hall, Philadelphia
71 The Dalles of St. Croix, No. 1
72 ,, ,, No. 2
73 Chicago
74 Falls of Killikinnick
75 Indian Chief
76 ,, ,,
77 Group of Indians
78 Buffalo
79 Mauch Chunk
80 The Photographers' Camp
81 Railway Incline
82 Pulpit Rock
83 Interior of Missisippi Steamer
84 Eclipse Expedition

CONTINENTAL.

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90 The Doge's Palace
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92 Street in Venice
93 Giant's Staircase
94 Statues ,,

SWITZERLAND.

95 On the Reuss—St. Gothard
96 The Lion of Lucerne
97 Falls of the Piumegna, Canton Tessier
98 Thun from the Cemetery
99 Lucerne and Mount Pilatus
100 Gorge of Pfeiffers
101 Chalets at Zermatt
102 Weggis, Lake Lucerne
103 Cascades, Canton Tessier
104 Bridge on the Mayenback
105 Village of Wasen, Pass St. Gothard
106 Castle of Chillon
107 Gersan, Lake Lucerne
108 The Falkness, Tyrol
109 The Capel Bruck, Lucerne
110 The Platifer, St. Gothard
111 Middle Bridge, Via Mala
112 Entrance to Via Mala
113 The Wetterhorn
114 Gorge of Ticino
115 Valley of the Tamina
116 Baths of Pfeiffers
117 Valley of St. Nicholas
118 Lake Maggiore
119 Valley of the Reuss
120 The Matterhorn
121 Car Road to Pfeiffers
122 Grisons
123 Pass of St. Gothard
124 Street in Zug

VARIOUS.

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125 The Three Porches, Bayeux
126 St. Ouen, Rouen
127 Town Hall, Brussels
128 Notre Dame, Rouen
129 Street in Caen
130 Old House in Caen
131 Church of St. Ouen, Rouen
132 Palais de Justice, Rouen
133 Cathedral of St. Lo, Normandy
134 Church of St. Pierre, Caen
135 Maison Batelier, Ghent
136 Amiens Cathedral Porch
137 ,, ,, Carved Screen
138 ,, ,, Altar
139 ,, ,, Interior
140 ,, ,, Stained Window
141 ,, ,, Exterior

BRITISH ISLES.

142 An English Homestead
143 The Frozen Fountain
144 Yacht Race on the Thames
145 Horticultural Gardens, Kensington
146 On the Thames at Fulham
147 Cottage at Fulham
148 Richmond Bridge
149 Ruins in Iona
150 Sir Walter Scott's Tomb
151 Robert Burn's Cottage
152 Corriemulzie Falls, Braemar
153 Cora Lynn, Falls of Clyde
154 Abergeldie Castle
155 Room at ,,
156 Douglas Pier and Bay, Isle of Man
157 Glen May Waterfall, Isle of Man

INDIA.

158 Group of Fruit, No. 1
159 Scenery of the Tropics, No. 1
160 ,, ,, ,, No. 2
161 ,, ,, ,, No. 3
162 ,, ,, ,, No. 4
163 ,, ,, ,, No. 5
164 ,, ,, ,, No. 6
165 Study of Foliage (the Bamboo)
166 Instantaneous Group, Java
167 Buitenzorg River, No. 1
168 ,, ,, No. 2
169 Study of Cocoa-Palms
170 Old Mosque at Bantam
171 Gambang Player
172 Singapore Harbour

ROCK CUT TEMPLES OF INDIA.

173 Bridge and Town of Ajunta
174 Seven Caves of Ajunta
175 Monastery Interior, Ajunta

No.

237 Jerusalem—The Mosque of Aska, Mount of Olives, &c.
238 Jerusalem—The Mosque of Aska
239 Jerusalem—View from near Mount Zion, Mosque of Omar
240 Jerusalem—The Mosque of Omar; the Site of Solomon's Temple
241 A Jerusalem Jew
242 Shiloh (Seilun)
243 Samaria, with Ruins of the Church of St. John
244 Nazareth from the West. The Summit of Mount Tabor just visible
245 Nazareth, from the East, with Well of the Virgin, &c.
246 Group at Nazareth
247 Mount Carmel.—Encampment by the Sea, under a large Olive Tree
248 Tiberius—Encampment by the Lake
249 Site of Bethsaida—Sea of Gallilee
250 Site of Capernaum—Teil Hum. Ruins of Synagogue, Cornice
251 Cæsarea Philippi (Baneas). Principal source of the Jordan
252 Mount Hermon—The Mount of Transfiguration
253 Damascus, with Ancient Great Mosque. Probably the longest Ecclesiastical Building in the World
254 Damascus—Interior of the Court of the Russian Consulate
255 Baalbeck—A General View of the Temples and the Range of Lebanon
256 Baalbeck—General View of the Temple of Jupiter
257 Baalbeck — Temple of Jupiter. The Great Portal, with Slipped Keystone, measuring 42 ft. high by 21 ft. wide
258 Baalbeck — Temple of Jupiter. Capitals, &c., on the south side of the Cella.
259 Cedars of Lebanon. Near View, Old and Young Trees
260 Cedars of Lebanon—(Upright)

ATHENS.

261 Athens and Mars' Hill. "Paul stood in the midst of Mars' Hill."
262 The Acropolis, the summit crowned with the Panthenon
263 The Caryatides
264 Theatre of Bacchus (near south-east corner of the Acropolis)

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267 The Great Pyramid and Sphynx, erected before Abraham went down into Egypt
268 Cairo—From the Citadel, with Mosque of Sultan Hassan
269 Cairo—Tombs of the Mamelukes, showing the Citadel
270 Cairo—Two Women Grinding Corn
271 Cairo—Mosque of Mohammed Ali (built of Veined Alabaster)
272 Cairo—Mosque of Mohammed Ali. View in the Court
273 Cairo—Arab Tombs on eastern side of City
274 Ruined Mosque in Desert, near Cairo
275 Cairo—Street View from Mosque of Sultan Hassan
275*a* Cairo—Street View, from Road to Citadel
275*b* Cairo—Bedouin with Dromedary
275*c* Cairo—The White Ass of Syria
276 Types—Bedouin Arab
277 ,, Turkish Guard
278 ,, Turkish Lady in Carriage Dress
278*a* ,, Turkish Lady in In-door Dress
279 ,, Turk
280 ,, Fellah
281 Alexandria—Pompey's Pillar
282 Alexandria—Cleopatra's Needle
283 Cairo—Beautiful Lattice Window or Mushrebéeh
284 Cairo—Shepherd's Hotel
285 Cairo—The Ruined Mosque of Tayloon. View from the Roof, showing the Citadel and south side of the City
286 Gezéh—The Pyramids of Cheops and Chephren; the oldest and largest Monuments in the World
287 Siout—View in Siout
288 Abydus—Specimen of the Sculptures from the Hall of the Great Temple of Abydus
289 Dendera—Columns supporting the Portico of the Great Temple
290 On the Nile—A Cargo Boat

No.
176 Hall of Villara, Ajunta
177 Porch of Chaitya, Ajunta
178 Great Window, Ajunta
179 Lower Part of Facade, Ajunta
180 Interior of Chaitya
181 Roof of Chaitya
182 Cave, Ajunta
183 Cave of Elephanta
184 Indian Temples

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191 ... ... No. 7
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195 ,, ,, ,,
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214 ,, ,, last ,,

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217 Sinai—Wâdy Feiran. Paran. Wild Palms and Arab Figure.
218 Sinai—Mount Horeb. Ras Susafeh and Plain of the Assemblage
219 Sinai—Convent of Sinai at the foot of the Horeb. On the supposed site of the Burning Bush.
220 Defile, near the Red Sea. The Wâdy el Ain. The probable site of the history in Numbers ix. 31.
221 Travellers on Dromedaries. Near Ezion Geber
222 Hebron, with Mosque covering the Cave of Machpelah
223 Bethlehem, from the Church of the Nativity
224 The Fountain of Jericho. Ain Sultan, healed by Elisha
225 Wilderness of Engedi. Convent of Mar Sarla, with Ravine of the Kidron
226 The Tomb of Rachel, with Olive Trees. An authentic site, "a little way" from Bethlehem
227 Jerusalem — from Mount Zion. With Mosque of Omar, &c., showing much of the Modern City
228 Jerusalem—The Garden of Gethsemane and Mount of Olives
229 Jerusalem—The Village of Siloam and the Valley of the Kidron
230 Jerusalem — The Wall of the Wailing. Fine Hebrew Masonry of great antiquity
231 Jerusalem—Facade of Church of the Holy Sepulchre
232 Jerusalem—Latin Monks
233 Jerusalem—Via Dolorosa
234 Jerusalem—View from the Walls looking East. "As the Mountains are round about Jerusalem," &c.
235 Jerusalem—Valley of Hinnom
236 Jerusalem—Turkish Tombs and Arab Shepherds. From near the Golden Gate

No.
291 On the Nile—Dahabéëh, or Nile Boats, used by Travellers
292 On the Nile—Interior of Dahabéëh
293 Thebes—The approach to Karnak. Avenue of Sphinxes
294 Thebes—The Temple of Karnak. The Hall of Columns, shewing the fallen Column and Remains of a Stone Window
295 Thebes—The Temple of Karnak. The Granite Sanctuary and the two Granite Monoliths
296 Thebes—The Temple of Karnak. The Central Avenue
297 Thebes—The Temple of Karnak. The fallen Obelisk and the Obelisk of Thomosis II.
298 Thebes—The South Portico of the Memnonium
299 Thebes—The Eastern Portico of the Memnonium, with Ruins of the prostrate Colossus
300 Thebes—The Colossi on the Plain of Thebes: the figure to the right being the Vocal Memnon
301 Asouan—General View of the first Cataract
302 Philæ—View on the Nile. The Ferry Boat to the Island
303 Philæ—Pharaoh's Bed, from the River
304 Philæ—The great Propylon and Outer Court of the Temple of Isis
305 Philæ—The Foot of the Cataracts, as seen from the Island of Philæ
306 Philæ—View of the Ruins, &c., on the Island of Biggeh, group of Nubians and Hut in the foreground.
307 Philæ—View of the Nile from Biggeh, looking East
308 Philæ—Distant View of the Island of Philæ, from the Mosque of Mishdd, looking North
309 Nubia—Sabooa. Stelæ, and Sculptured Sphinxes
310 Nubia—Aboo-Simbel. Façade of the small rock Temple dedicated to Athor. The total depth of this excavation is about 90 feet from the door
311 Nubia—Aboo Simbel. The great rock Temple of Aboo-Simbel, remarkable for the most beautiful colossi found in any of the Egyptian ruins. The total height of the façade of this great temple is about 100 feet

CONSTANTINOPLE.

No.
312 The Fountain of the Seraglio. Mosque of St. Sophia in the background
313 General View of the New Palace and the Bosphorus, from the West
314 View from the Seraskier Tower, looking towards Pera
315 View from the Seraskier Tower, showing the Golden Horn and Mosque of Sultan Sulevman
316 View from the Seraskier Tower, showing several of the large Mosques and roofs of the Bazaars; in the background can be seen the large Military Hospital at Scutari
317 Fountain of Sweet Waters, on the Asiatic Shore of the Bosphorus

SMYRNA.

318 General View of the Town, &c. from the hill of the Citadel

TOWER OF LONDON SERIES.

From Negatives by FRANK M. GOOD, Esq.

319 The Tower of London, from Tower Hill
320 The Byward Tower, from the West
321 The Bell Tower and Byward, from the East
322 The Traitor's Gate, from the River side
323 The Horse Armoury. General View
324 The Horse Armoury. Henry VIII. on horseback, with a foot soldier on his left. The suite is known to have belonged to the Monarch whose effigy it adorns.
325 A Group of Warders in full Dress. The Warders were anciently the servants of the Constable of the Tower, employed by him to guard the prisoners and watch the gates, but through the influence of the Duke of Somerset, Protector during Edward VI.'s minority as a reward for their attention to him whilst a prisoner in the Tower, they were appointed extraordinary yeoman of the guard; and they have ever since worn the dress of that body, instituted

No.

by Henry VII. This honour is now usually bestowed on Veterans who have distinguished themselves in their country's service

326 Portrait of Warder in Full Dress

327 View in the White Tower. Small Arms Stores, showing the tasteful arrangements of these weapons, to resemble flowers, &c.

328 Tower of London, from Tower Hill, showing the Beauchamp Tower

329 The Middle, Byward, and Bell Towers. Bird's-eye view

JAVA & THE JAVANESE SERIES.

From Negatives by W. & H. Woodbury.

342 Mail Steamer Coaling
343 Scenery of the Tropics No. 1
344 ,, ,, No. 2
345 ,, ,, No. 3
346 ,, ,, No. 4
347 Study of Foilage
348 Study of Cocoa Palms
349 Buitenzorg River
350 Mosque at Bantam
351 Native Campong, or Village
352 Palace of Bamboo
353 Bamboo Bridge
354 Mount Arjuno
355 Palace of Governor, Fan Palms
356 Instantaneous Group
357 Indian Fruit
358 Emperor of Java as Mahomedan Priest
359 Empress of Java
360 Crown Prince
361 Sultan of Java and Family
362 Wife of Sultan, Son and Female Attendants
363 Daughter of Sultan
364 Thirty-second Child of Emperor
365 Javanese in Court Dress
366 Native Princess
367 Native Gamelan (Band) of Emperor
368 Instruments, with Players. The Rebab
369 ,, ,, The Bonang
370 ,, ,, The Géuder
371 ,, ,, The Suling
372 ,, ,, The Gong
373 ,, The Small Génder
374 ,, ,, The Kenong
375 ,, ,, The Saron
376 Emperor's Body Guard
377 ,, Dwarf
378 ,, Spittoon Bearer

No.

379 Serimpies, or Dancing Girls of Emperor. No. 1
380 ,, ,, No, 2
381 Rongeng, or Native Dancers
382 Si-Ami. A Native Beauty
383 Native Method of Travelling
384 Native Actor
385 Gambang Player
386 Opium Smoker, Javanese
387 ,, ,, ,, and Chinese
388 Bride and Bridegroom
389 Bride in costume
390 Native Girls chewing Betel
391 Javanese Girl, lower class
392 ,, ,, No. 2
393 Native Sweetmeat Vendor
394 ,, Gentlemen
395 Njei, or Native Housekeeper
396 Native Masquer
397 Interior of Native Hut
398 Buffalo Cart
399 Arab Chief

Nos. 343 to 350, and 356 and 357, are same as those numbered in first part of list under head of India, but placed here to complete the Javanese Series.

SPANISH SERIES.

From Negatives by F. M. Good, Esq.

421 Bayonne—From the Citadel
422 Biarritz—From the Lighthouse
423 ,, The Oyster Beds
424 ,, The Bathing Place
425 ,, The Virgin Rock
226 Pamplona—Panorama from the Citadel
427 Saragossa—View in the Market
428 Barcelona—From Monjure
429 ,, View from Bella Vista The Harbour, &c.
430 Barcelona—The Ancient Gate of the City
431 Barcelona—Entrance to the Church of Santo Maria del Pino
432 Barcelona—Doorway of La Real Audencia
433 Barcelona—Fountain on Plaza Real
434 Valencia—Façade of the Cathedral
435 ,, Apostles Door of Cathedral
436 Valencia—Doorway of Cathedral or Portal del Palan, curious, of the 14th Century
437 Valencia—The Lonja or Exchange
438 Tarragona—General View

No.
439 Tarragona—View from the Ramparts, showing remains of Roman Amphitheatre
440 Tarragona--Front of the Cathedral
441 ,, The Cathedral—Door leading into the Cloisters, 13th Century work, purely Byzantine and curious
442 Tarragona—Cloisters of Cathedral beautiful Capitals of the 13th century
443 Tarragona—The Cathedral, shewing Cloister Arches
444 Tarragona—Cathedral—Entrance to Chapter House, Norman
445 Tarragona — The Cathedral — View in the Cloister Garden
446 Tarragona—View of the Roman Aqueduct
447 Tarragona—Scipio's Tomb.
448 Cordova—Panorama—Moorish Mill in the foreground
449 Cordova—The Cathedral from the River
450 Cordova—Bridge and Gateway
451 ,, Tower of Cathedral
452 ,, Interior of Cathedral or Mosque. General View. The most perfect specimen extant, or ever erected, of the Religious Architecture of the Moors of Spain
453 Cordova — Cathedral — Moorish Doorway
454 Cordova — Cathedral — Entrance to Cloisters
455 Cordova — Market Place (very picturesque)
456 Cordova — Market Place (side view)
457 Cordova — Street View. The streets of Cordova are said to be the first that were ever paved in Europe
458 Cordova—Tower and Bridge. This Tower is interesting from its having played an important part during the Siege of Cordova, by Pedro of Castile
459 Cordova—Fountain of Terre de la Mala Muerte and Moorish House
460 Cordova — The Caliph's Tower from Road
460*a* Cordova—The Caliph's Tower
461 ,, The Caliph's Avenue
462 ,, A Market Bit
463 ,, A Persian Water Wheel The same as used in Egypt for raising water for irrigation
464 Seville—The Cathedral
465 ,, The Cathedral from Alcazar

No.
466 Seville—Bridge over the Guadalquiver
467 Seville—Entrance to Alcazar
468 ,, Entrance to Alcazar
469 ,, Near View of detail of Inner Court
470 Seville—Alcazar (detail)
471 ,, Fountain in the Lower Court of the Alcazar
472 Seville—Court of the Alcazar
472*a* ,, Another View
473 ,, Moorish Arches, Alcazar
474 ,, Bath in Garden of the Alcazar
475 Seville — Casa de Pilatos. So called because built in imitation of Pontius Pilate's House at Jerusalem. The Fountain.
476 Seville — Casa de Pilatos. So called because built in imitation of Pilate's House at Jerusalem. View on the South side of Court
477 Seville—Minerva with Club, in the Casa de Pilatos. So called because built in imitation of Pilate's House at Jerusalem
478 Seville—Minerva with Spear, in the Casa de Pilatos. So called because built in imitation of Pilate's House at Jerusalem
479 Seville—Bull Ring

CATHEDRAL SERIES.

480 Canterbury Cathedral, from the South
481 Canterbury Cathedral, from the East
482 Canterbury Cathedral, the Nave, West
483 Canterbury Cathedral, South Door
484 ,, ,, North Nave Aisle
485 Canterbury Cathedral, Transept of the Martyrdom
486 Canterbury Cathedral, Martyrdom Door
485 Canterbury Cathedral, St. Michael's or the Warrior's Chapel
488 Canterbury Cathedral, the Corona looking West
489 Canterbury Cathedral, Entrance to Chapter House
490 Canterbury Cathedral, Tomb of Edward the Black Prince
491 Canterbury Cathedral, View in the Cloisters
492 Canterbury Cathedral, the Crypt
493 ,, ,, the Baptistry

No.
494 Canterbury Cathedral from the North, with Ruins of Monastery
495 Canterbury Cathedral, Norman Staircase, King's School
495*a* Canterbury Cathedral, Tomb of Henry IV, and his second wife, Joan of Navarre
496 Winchester Cathedral, from the North
497 Winchester Cathedral, West-end
498 ,, ,, Chantries of Cardinal Beaufort and William Wayneflete
499 Winchester Cathedral, Chantry of William of Wykeham
500 Winchester Cathedral, the Font
501 ,, ,, Tomb and Effigy of William of Wykeham
502 Winchester Cathedral, the Nave, West
503 Winchester Cathedral, South Aisle of Presbytery
504 Winchester Cathedral, the Nave, East

VARIOUS.

No.
505 Bramshill House
506 ,, ,, West Front
507 ,, ,, Avenue of Elms
508 ,, ,, State Drawing Room
509 Bramshill House, Chapel Drawing Room
510 Bramshill House, the Hall
511 ,, ,, the old Oak Chest, said to be that in which the bride hid
512 Windsor Castle from the River
513 Corfe Castle, Dorset
514 St. Paul's, from south west
515 Shanklin Chine, Isle of Weight
516 Studland, Dorset—a cottage bit
517 A Lane Bit, Dorset
518 Eversley Church and Rectory, Charles Kingsley in the foreground

EXTRACTS FROM THE PRESS.

Relative to the Woodbury Lantern Slide.

"In every point of excellence as slides, those produced by the mechanical printing process bore the palm, being singularly delicate, sharp, luminous, and of excellent colour."—*Photographic News*, January 17, 1873

"The reading of the paper was followed by a lantern exhibition, in the course of which many charming transparencies were shown upon the screen, those by the Woodbury process being remarkable for their exceeding delicacy, brilliancy, and good tone."—*British Journal*, January 17, 1874.

"The Woodbury photo-relief was well represented. Although the slides made by the silver process were admirable, yet there was a brilliancy and delicacy of tone observed in the Woodbury pictures that distinguished them at once."—*Report of Exhibition at the Franklin Institute Philadelphia*, December 13, 1872.

"On motion, then adjourned to witness an exhibition with the Marcy Sciopticon, by Mr. Carbutt, of a large number of fine Niagara and other slides, made by that best of all processes, the Woodbury; also a number of carbon slides by Cook, which were also fine, but suffered in contrast with the Woodbury."—*Report of Pennsylvania Photographic Association.*